CLAIMS

What is claimed is:

1. An optical latch, comprising:

a "SET" input and a "RESET" input, the optical latch being configured to achieve at least one stable state in response to the input of predetermined signals to, respectively, the "SET" input and the "RESET" input;

a first output and a second output; and

first and second LSOAs, each of the first and second LSOAs having an input configured to receive optical signals and a laser output configured to output a laser output optical signal in response to a received optical signal, the input of the first LSOA being connected to the "SET" input and to the laser output of the second LSOA, the input of the second LSOA being connected to the "RESET" input and to the laser output of the first LSOA, the laser output of the first LSOA being connected to the first output, and the laser output of the second LSOA being connected to the second output.

2. The optical latch as recited in claim 1, wherein, in the at least one stable state, an output signal from the first output is low and an output signal from the second output is high.

3. The optical latch as recited in claim 2, wherein the at least one stable state is achieved in response to the input of a high signal to the "SET" input and the input of a low signal to the "RESET" input.

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4. The optical latch as recited in claim 1, wherein, in the at least one stable state, an output signal from the first output is high and an output signal from the second output is low.

5. The optical latch as recited in claim 4, wherein the at least one stable state is achieved in response to the input of a low signal to the "SET" input and the input of a high signal to the "RESET" input.

6. The optical latch as recited in claim 1, wherein the optical latch has at least two stable states.

7. The optical latch as recited in claim 1, wherein at least one of the LSOAs comprises a VLSOA.

8. The optical latch as recited in claim 1, wherein the optical latch has a bistable state.

9. The optical latch as recited in claim 1, wherein the bistable state is achieved when both the "SET" and "RESET" inputs are low.

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10. The optical latch as recited in claim 1, wherein the first LSOA further comprises:

a laser cavity with an optical path;

an amplifying path connected to the input of the first LSOA and passing through the laser cavity, the amplifying path being configured to propagate optical signals received at the input; and

a pump input connected to the laser cavity and configured to receive a pump for exceeding a lasing threshold for the laser cavity, the first laser output optical signal being output in response to propagation of the received optical data signals through the amplifying path.

11. The optical latch of claim 1, further comprising:

a first combiner connected to the "SET" input, the input of the first LSOA, and the laser output of the second LSOA, the first combiner being configured to receive optical signals from the "SET" input and the laser output of the second LSOA, and the first combiner being further configured to output a combined optical signal to the input of the first LSOA; and

a second combiner connected to the "RESET" input, the input of the second LSOA, and the laser output of the first LSOA, the second combiner being configured to receive optical signals from the "RESET" input and the laser output of the first LSOA, and the second combiner being further configured to output a combined optical signal to the input of the second LSOA.

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12. The optical latch of claim 1, further comprising:

a first splitter connected to the laser output of the first LSOA, the input of the second LSOA, and the first output, the first splitter being configured to receive optical signals from the laser output of the first LSOA, and the first splitter being further configured to output optical signals to the input of the second LSOA and to the first output; and

a second splitter connected to the laser output of the second LSOA, the input of the first LSOA, and the second output, the second splitter being configured to receive optical signals from the laser output of the second LSOA, and the second splitter being further configured to output optical signals to the input of the first LSOA and to the second output.

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13. An optical clocked latch, comprising:

a "SET" input and a "RESET" input, the optical clocked latch being configured to achieve at least one stable state in response to the input of predetermined signals to, respectively, the "SET" input and the "RESET" input;

a first output and a second output;

first and second LSOAs, each of the first and second LSOAs having an input configured to receive optical signals and a laser output configured to output a laser output optical signal in response to a received optical signal, the input of the first LSOA being connected to the "SET" input and to the laser output of the second LSOA, the input of the second LSOA being connected to the "RESET" input and to the laser output of the first LSOA, the laser output of the first LSOA being connected to the first output, and the laser output of the second LSOA being connected to the second output; and

a first optical AND gate and a second optical AND gate, each having a corresponding input and a clock input, an output of the first optical AND gate being connected to the "SET" input, and an output of the second optical AND gate being connected to the "RESET" input.

14. The optical clocked latch as recited in claim 13, wherein the optical clocked latch is configured so that the clock input to the first optical AND gate is the same as the clock input to the second optical AND gate.

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15. The optical clocked latch as recited in claim 13, wherein the clock input to both of the optical AND gates is high for the at least one stable state.

16. The optical clocked latch as recited in claim 13, wherein in the at least one stable state, an output signal from the first output is low and an output signal from the second output is high.

17. The optical clocked latch as recited in claim 16, wherein the at least one stable state is achieved in response to the input of a high signal to the "SET" input and the input of a low signal to the "RESET" input.

18. The optical clocked latch as recited in claim 13, wherein, in the at least one stable state, an output signal from the first output is high and an output signal from the second output is low.

19. The optical clocked latch as recited in claim 18, wherein the at least one stable state is achieved in response to the input of a low signal to the "SET" input and the input of a high signal to the "RESET" input.

20. The optical clocked latch as recited in claim 13, wherein the optical clocked latch has at least two stable states.

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21. The optical clocked latch as recited in claim 20, wherein the clock input to both of the optical AND gates is high for each of the at least two stable states.

22. The optical clocked latch as recited in claim 13, wherein at least one of the LSOAs comprises a VLSOA.

23. The optical clocked latch as recited in claim 13, wherein the optical clocked latch has a bistable state.

24. The optical clocked latch as recited in claim 23, wherein the bistable state is achieved when both the "SET" and "RESET" inputs are low.

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25. An optical latch, comprising:

a first VLSOA having a pump input, an amplifier input, an amplifier output, and a ballast laser output;

a first combiner connected to a "SET" input and a second input and having an output arranged for communication with the amplifier input of the first VLSOA;

a first splitter having a "Qbar" output and a second output and having an input arranged for communication with the ballast laser output of the first VLSOA;

a second VLSOA having a pump input, an amplifier input, an amplifier output, and a ballast laser output;

a second combiner connected to a "RESET" input and the second output of the first splitter, and having an output arranged for communication with the amplifier input of the second VLSOA; and

a second splitter having a "Q" output and a second output, the second output being in communication with the second input of the first combiner, and the second splitter having an input arranged for communication with the ballast laser output of the second VLSOA.

26. The optical latch as recited in claim 25, wherein the optical latch has at least first and second stable states.

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27. The optical latch as recited in claim 25, wherein the first stable state is achieved in response to the input of a high signal to the "SET" input and the input of a low signal to the "RESET" input, and, in the first stable state, an output signal from the "Qbar" output is low and an output signal from the "Q" output is high.

28. The optical latch as recited in claim 25, wherein the second stable state is achieved in response to the input of a low signal to the "SET" input and the input of a high signal to the "RESET" input, and, in the second stable state, an output signal from the "Qbar" output is high and an output signal from the "Q" output is low.

29. The optical latch as recited in claim 25, further comprising:

a first optical AND gate having an input and a clock input, an output of the first optical AND gate being connected to the "SET" input; and

a second optical AND gate having an input and a clock input, an output of the second optical AND gate being connected to the "RESET" input.

30. The optical latch as recited in claim 29, wherein the optical latch is configured so that the clock input to both of the optical AND gates is high for the at least first and second stable states.

31. The optical latch as recited in claim 25, wherein the optical latch has a bistable state.

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32. The optical latch as recited in claim 31, wherein the bistable state is achieved when both the "SET" and "RESET" inputs are low.

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